

REMARKS

Applicants have received and carefully reviewed the Office Action mailed December 19, 2002. Claims 1-15 remain pending, claims 16-27 having been withdrawn from consideration. Reexamination and reconsideration are respectfully requested.

In paragraph 3 of the Office Action, the Examiner rejected claims 1-4 under 35 U.S.C. §102(b) as being anticipated by Donald, U.S. Patent No. 3,404,203. After carefully reviewing the cited reference, Applicants respectfully disagree.

The Examiner states:

Donald teaches the rotating of the mandrel and an affixed die (24) in opposite directions at a point directly after the material exits the main internal passageway (16) in order to impart molecular orienting of the heat plastified thermoplastic material adjacent to the mandrel and the affixed die (Figures, Claim 1, Column 2, lines 22-48). This constitutes a teaching of rotating the elongated polymer member downstream of the extrusion head (internal passage) prior to solidification in order to impart molecular helical orientation to the elongated polymer member.

Office Action, Paragraph 3. Applicants disagree with this application of the claim language to the process illustrated by Donald.

As Applicants understand it, the process suggested by Donald is designed to achieve more complete intermixing of the material being extruded once it contacts the mandrel. For example, Donald begins by describing the difficulties encountered in extruding pipes to withstand a variety of stresses due to the existence of weld lines:

The process of extrusion frequently incorporates within the walls of the pipe or tube inherent defects or weak areas. Generally such weakened regions comprise linear faults extending lengthwise along the conduit wall and are frequently caused by weld lines. For example, in the extrusion of the tube about a mandrel frequently the plastic material is forced into the extruder die in such a manner that it must be divided and flow about the mandrel. Thus the point at which the incoming stream flows together again

often forms what is known as a weld line within the extruded product. Frequently such a weld line is a region of weakness.

Column 1, lines 31-44. Donald later explains the functional aspects of the disclosed process:

It is critical in the practice of the present invention that neither the mandrel-plastic interface nor the die-plastic interface be lubricated to a degree sufficient to prevent the interior or exterior surfaces of the plastic tube from being rotated with respect to each other. Thus effectively the wall of the plastic article being extruded is placed under a circumferential shear force as well as the linear force generated by the expulsion of the plastic material from the die.

Column 2, line 72 to column 3, line 8. As explained by Donald, the extruded plastic should stick to the mandrel and the die sufficiently to create a shear force within the extruded plastic from the inside to the outside of the tube wall, thus causing the surfaces to be rotated with respect to each other. This process then creates a helical orientation of the weld lines, causing a weld-line location on the outside of the tube wall to be mis-oriented with respect to a weld-line location on the inside of the tube wall. In effect, the material is mixed while on the mandrel and within the die in order to prevent weld-lines, created during the actual process of extrusion onto the mandrel as material is forced about the mandrel, from creating a weakness.

In order to effect a mixing as described by Donald, the mandrel and die are rotated with respect to one another, creating a mixing effect within the extruder heat. Applicants contend that the extruder head, as defined by Applicants invention, would include all of device 10 of Donald's Figure 1, including the die 24. This is supported, for example, by Donald's description of temperatures to apply: "Oftentimes the temperature within the crosshead may be maintained slightly lower than in conventional processes because of the minor amount of heat generated in the extruder by the rotational shear imparted to the plastic by the rotating die and mandrel."

Column 3, lines 22-27. Hence the rotation which creates the rotational shear is occurring within the extruder, since that is where the heat is being created.

The rotation of the extruded material by Donald does not occur downstream of the extruder head, but rather, inside the extruder itself. Therefore, the die 24 illustrated in Figure 1 of Donald would correspond to outlet 26 within the extruder head 20 of Applicants' Figure 1.

In light of the above remarks, Applicants believe that claim 1, and dependent claims 2-4, are all patentable over Donald at least because the rotation suggested by Donald does not constitute rotation downstream of the extruder head.

In paragraph 5 of the Office Action, the Examiner rejected claims 1-15 under 35 U.S.C. §103(a) as being unpatentable over Wang et al., U.S. Patent No. 5,951,494 in view of Donald. After careful review of the cited references, Applicants respectfully disagree.

In particular, Applicants note that Wang et al. teach that the tension, heat and twisting is a post-processing technique performed on a pre-formed polymer member. The pre-formed polymer member may be, for example, a rod, a tube, a polymer-metal composite, or a polymer/non-metal composite. Because Wang et al. teach post-processing of a pre-formed polymer member, the resulting oriented polymer member inherently involves two (or more) separate processes. First, the polymer member must be formed by, for example, an extrusion process, and second, the polymer member must be oriented by post-processing (i.e., tension, heat and twisting). These multiple processes may make fabrication more complicated, costly, and less efficient.

Applicants also note that there is no suggestion in Donald to rotate the extruded member downstream of the extruder head, as recited in claim 1. It does not appear that Wang et al.

satisfy this deficiency of Donald. Therefore, Applicants believe that independent claim 1, along with dependent claims 2-15, are all patentable over Wang et al. in view of Donald.

Reconsideration, reexamination, and allowance of all pending claims 1-15 are respectfully requested. Issuance of a notice of allowance in due course is respectfully requested. If a telephone conference might be of assistance, please contact the undersigned attorney at (612) 677-9050.

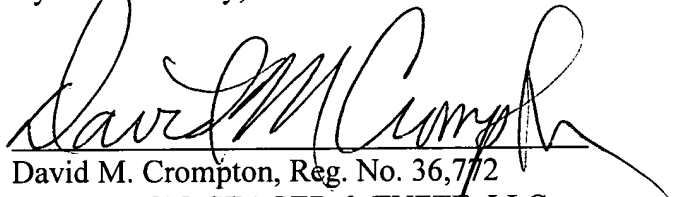
Respectfully submitted,

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By their Attorney,

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